VETERINARY MEDICINE BIOMEDICAL SCIENCES (VTBMS)

VTBMS 1200 - Veterinary Medicine: Science and Practice (3 Credits)
The course serves as an introduction to the science and practice of veterinary medicine. Aspects of the anatomy and physiology, and their clinical applications along with introducing other clinical specialties will provide insight into the knowledge that supports the practice of veterinary medicine. Content will also offer insight into the diversity of career options available in this and related fields. Study will be at the level of introductory undergraduate course material.
Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Schedule of Classes (https://classes.cornell.edu/)

VTBMS 1210 - Genomic Data Science in Dogs (3 Credits)
This course introduces students to genomic data science using real genomic datasets from cutting edge dog genetic research. Students will learn key background concepts for understanding genomics, develop key skills for accessing and evaluating genomic data, and discuss future opportunities and ethical concerns regarding dog and human genetic testing. As part of the course, students will be introduced to both genetics and data science and will also have the option to do commercial genetic testing on their own pet dog. This is an intensive, interactive course including asynchronous lecture material, live office hours, online discussion, and multiple problem sets involving different genetic databases.
Enrollment Information: Enrollment limited to: undergraduates and precollege students.
Last Four Terms Offered: Summer 2025
Schedule of Classes (https://classes.cornell.edu/)

VTBMS 3460 - Principles of Animal Physiology (3 Credits)
Crosslisted with BIOAP 3110, BIOMS 3110
General course in animal physiology emphasizing principles of operation, regulation, and integration common to a broad range of living systems from the cellular to the organismal level. Structure/function relationships are stressed along with underlying physico-chemical mechanisms.
Prerequisites: BIOG 1500 and BIOG 1440 or BIOG 1445 or one year of college biology, one year of chemistry and mathematics or equivalent AP credit.
Distribution Requirements: (BIO-AS), (BSC-AG, OPHLS-AG)
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2022, Fall 2021
Learning Outcomes:

- Students should be able to rationalize the operation of major organ systems.
- Students should understand the organization of multisystem regulatory loops.
- Students should be able to derive and understand the basic equations defining the physical operating characteristics of organ systems.

Schedule of Classes (https://classes.cornell.edu/)

VTBMS 6501 - Natural Engineering: Developmental Biology Paradigms for Regenerative Medicine (3 Credits)
Crosslisted with BME 6501
This course is in two modules. The first module (1 credit) identifies fundamental biophysical mechanisms and systems engineering of early embryonic development (cleavage, gastrulation) and axis patterning. The second module (2 credits) extends these fundamentals to fetal maturation of several major organ systems, including lung, heart, vascular, and bone from an engineer's perspective (evolutionary conservation, major signaling pathways involved, etc). We further identify relationships between developmental biology and postnatal diseases, as well as explore developmental biology-based approaches for regenerative medicine (directed stem cell differentiation, mechanical conditioning, matrix based differentiation, etc.). Material is drawn largely from primary literature. Students have regular manuscript reviews, two midterms, and a final project analyzing the natural engineering of a different organ system.
Enrollment Information: Enrollment limited to: graduate students.
Last Four Terms Offered: Spring 2025, Spring 2023, Fall 2020, Fall 2018
Schedule of Classes (https://classes.cornell.edu/)

VTBMS 7010 - Mouse and Stem Cell Pathology (1 Credit)
Crosslisted with TOX 7010
Introduction to principles and methods of pathology. Pathology role in stem cell research, regenerative medicine and cancer biology. Systematic evaluation of mouse models, with a particular attention to such topics as experimental design, model validation, identification of novel phenotypes, histotechnology and mouse necropsy.
Prerequisites: Recommended prerequisite: BIOAP 4130.
Last Four Terms Offered: Fall 2024, Fall 2023, Fall 2021, Fall 2019
Learning Outcomes:

- Understand principles and methods of pathology as discipline.
- Experience in planning of animal experiments, collecting and processing of biological materials.
- Become familiar with pathology terminology.
- Learn about the role of stem cell pathology in stem cell research and regenerative medicine.

Schedule of Classes (https://classes.cornell.edu/)

VTBMS 7020 - The Practice of Laboratory Animal Medicine (1 Credit)
A laboratory animal veterinarian must be trained in the regulatory aspects of research and teaching utilizing animals; in addition they must understand the principles of facility management and design. Also, to work with researchers, a lab animal veterinarian must have knowledge of basic research methodologies and animal welfare issues. This course may also be of interest to other veterinarians, veterinary students, and researchers who wish to understand the workings of the specialized field that oversees and enables the use of animals in research and teaching. The topics covered include: Laboratory Animal Medicine: Laws, Regulations, and Policies; Design and Management of Animal Facilities; Anesthesia, Analgesia, and Euthanasia; Techniques of Experimentation; Control of Biohazards used in animal research; Selected zoonoses/xenozoonoses; Genetic monitoring; Transgenic and knock-out mice; Factors influencing animal research; Animal models in biomedical research; Research in Lab Animal and Comparative Medicine; Lab Animal Behavior. The course will meet for 1 hour weekly and will extend over the course of two years, though each term is independent and can be taken separately.
Prerequisites: basic knowledge of anatomy and pathology in comparative animal species.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

VTBMS 7030 - The Biology and Diseases of Laboratory Animals (2 Credits)
Intended for veterinarians entering the field of laboratory animal medicine. It may also be of interest to other veterinarians, veterinary students, and researchers with a basic knowledge of anatomy and pathology who use animals in research or teaching. This course will cover the main laboratory animal species (rodents, rabbits, non-human primates, ruminants, swine, dogs, cats, ferrets, reptiles, amphibians, and fish). The biology, husbandry, diseases, pathology, and main research uses of these species will be covered. The course will meet for 2 hours weekly and will extend over the course of two years.
Prerequisites: basic knowledge of anatomy and pathology in comparative animal species.
Enrollment Information: Enrollment limited to: upper-level undergraduate or graduate students.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)

VTBMS 7130 - Cell Cycle Analysis (1 Credit)
Crosslisted with TOX 7130
Presents a brief historical review of the cell cycle; a summary of cell cycle regulatory processes; and practical methods for cell cycle analysis, including mathematical representations. Topics include: growth control of bacterial cell cycle including chemostats, mammalian cell tissue culture, cell synchronization, flow cytometry, age-density representation, G1 regulation, labile regulatory protein models, cell transformation, regulation by growth factors and the cytoskeleton, cyclin/E2F/RB regulatory model, practical examples for analysis of cell cycle phase durations, cell cycle phase specific growth factor sensitivity, timing of RB protein phosphorylation within the cell cycle. The objective of the course is to present graduate students with methods for cell cycle analyses that will be used in their research.
Last Four Terms Offered: Spring 2020, Spring 2019, Spring 2018, Spring 2017
Schedule of Classes (https://classes.cornell.edu/)

VTBMS 7200 - Biomedical and Biological Sciences Seminar (1 Credit)
Designed to train graduate students in public presentation and critical analysis of scientific data. Students are required to give a seminar on their research, and provide constructive feedback to others on the quality of their presentation and data.
Last Four Terms Offered: Spring 2025, Fall 2024, Spring 2024, Fall 2023
Schedule of Classes (https://classes.cornell.edu/)